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MODEL 8180
REMOTE TIME DISPLAY
SERIAL NO. 1067
(B)

SYSTRON DONNER

INSTRUCTION MANUAL

MODEL 8180
REMOTE TIME DISPLAY
SERIAL NO. 1067
(B)

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SYSTRON DONNER CORPORATION

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FSCM No. 53947

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STANDARD OPTIONS

Standard options installed in your unit are checked below. Circuit descriptions are provided in Chapter 5. Special modifications, when included, are described in Chapter 6.

SERIAL NUMBER 1067

OPTION		DESCRIPTION
A15	☐	I/O Buffers (T.O.D.). Adds buffers to drive up to four additional displays. Hours, minutes and seconds.
A15A	☐	I/O Buffers (T.O.Y.). Same as A15 but for days, hours, minutes and seconds.
E13	☐	Days. Adds three digits to the display.
M16	☐	Mounting Yoke, ceiling/wall.
	☐	Special Modification (See Chapter 6).

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CHAPTER 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

The Model 8180 Remote Display accepts parallel BCD time information and it in decimal hours, minutes and seconds. Days may be included as an option.

The parallel BCD input connector is wired in parallel to a second connector which may be used to chain cable up to four displays from any Systron-Donner 8000 Series Time Code Generator or Reader. The addition of optional buffers to each fourth unit in a series permits any number of displays to be operated.

1.2 SPECIFICATIONS

Display: Six-digit, in-line, 7-segment planar readout displays time in hours, minutes and seconds. Numerals are one inch (25 mm) high. Lighted colons are provided between hours and minutes and minutes and seconds digits. The Days Option adds three digits to the display.

Inputs: Positive level, positive logic, TTL/DTL compatable, parallel BCD inputs.

Code:	8-4-2-1
Logic:	"1" = +2.4 to +5.5 V
	"0" = 0.0 to 0.8 V

Buffered Outputs: The optional buffered parallel BCD outputs are supplied via the connector normally wired in parallel with the inputs. (Amph. 57-40500)

Code:	8-4-2-1
Logic	"1" = 5 ±0.5 V behind 6 kΩ.
	"2" = 0 to +0.5 V, 12 mA sink.

Environment:

Operating:	0°C (32°F) to 65°C (150°F) at up to 95% relative humidity.
Storage and Shipment:	=55°C (-69°F) to 85°C (185°F).

Power: 115/230 volts ±10%, 48 to 440 Hz at less than 12 watts via rear panel three-pin ac connector. Power cable is supplied.

Dimensions: 3½"H x 19"W x 9-1/8"D (8.9 x 48.3 x 23.2 cm). Removable rack handles.

Weight: 8 lbs. (3.6 kg) net, 10 lbs. (4.5 kg) shipping.

Package: The Model 8180 Remote Display is normally supplied as a 3½-inch by 19-inch rack mount panel which compliments all the new Systron-Donner 8000 Series timing units. Removable rack handles allow the display to be operated on the bench or with the optional all-angle swivel yoke assembly. In this configuration the width is reduced to 16-3/4" (42.5 cm).

CHAPTER 2
INSTALLATION

2.1 INITIAL INSPECTION

As soon as the instrument is received, verify that it is intact and as ordered. Inspect if for damage. If any shipping damage is found refer to the warranty at the front of this manual and to Section 2.2 for repackaging and shipping instructions.

As soon as possible, the instrument should be installed and given a thorough electrical inspection. Should the instrument fail to operate properly or fail to meet the listed specifications, immediately contact your Systron-Donner representative.

2.2 STORAGE AND RESHIPMENT

Environmental conditions during storage and shipment should be limited as follows:

Maximum Temperature: 185°F (85°C)

Minimum Temperature: -69°F (-55°C)

To protect your instrument during shipment or storage, use the best packaging methods available. Your Systron-Donner field office can provide materials similar to those used for original factory packaging. Contract packaging companies can provide dependable packaging on short notice.

General packaging instructions:

1) Wrap the instrument in heavy paper or plastic before placing it in the shipping container.

2) If possible, use the original container designed for the instrument. Otherwise, use a strong carton (350 lb.sq.in. bursting strength) or wooden box to house the instrument.

3) Use plenty of packaging material around all sides of the instrument and protect the front panel with cardboard strips.

4) Seal the package with strong tape or metal bands. Mark the package with "DELICATE INSTRUMENT".

5) Refer to the warranty at the front of this manual and check with your Systron-Donner field office for shipping instructions. All correspondence should refer to the instrument by its model number and full serial number.

2.3 POWER REQUIREMENTS

The Model 8180 can operate from 115 V or 230 V ±10%, 48 to 440 Hz, 15 watts. The unit is normally supplied for 115 volt operation.

To adapt the Model 8180 for 230 volt operation, remove the jumper wire between pins 1 and 2 and also pins 3 and 4 of the main power transformer (T1). Install a jumper wire between pins 2 and 3 of the main power transformer.

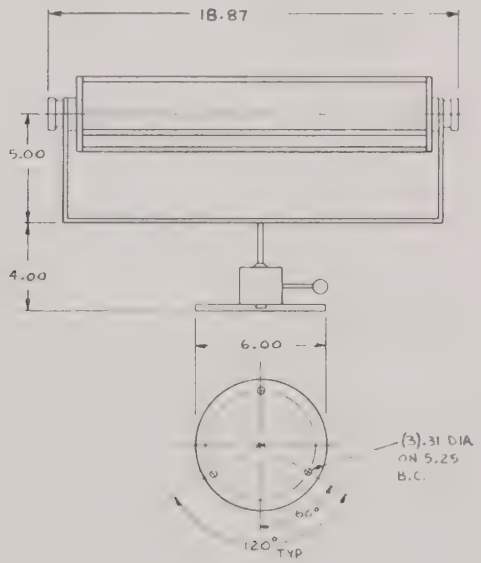
CAUTION

Disconnect all power from the unit before changing voltages.

2.4 YOKE MOUNTING

The instrument is normally supplied for bench top or rack mounted operation. If yoke mounting is desired (Option M16), the following steps are necessary.

1) If supplied for rack mount, remove the rack mounting ears.
2) Drill three holes in mounting surface to accommodate yoke base, and bolt the base into position.
3) Insert the unit into the yoke fork and attach the unit to the fork with two wing bolts (supplied).
4) Insure that enough slack is present in the signal cable and power cord to allow the unit to rotate a full 360 degrees.

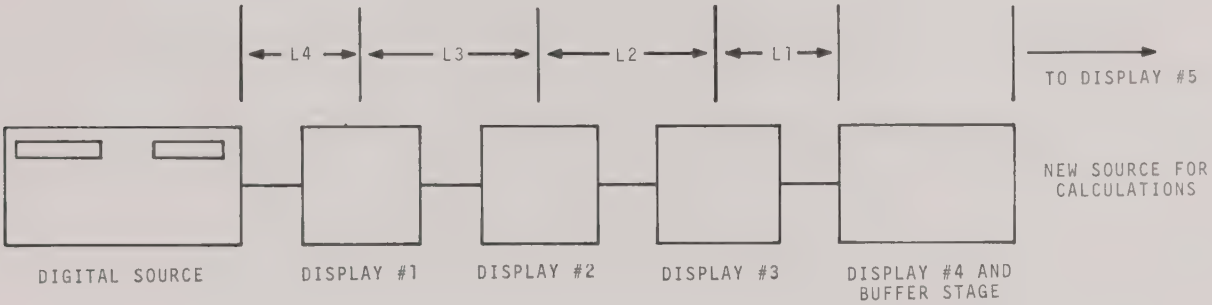


YOKE MOUNTING OPTION #021814

2.5 INSTALLATION

Due to the voltage loss in the ground return wire, the maximum distance between the Model 8180 and the digital source is limited by the number of units installed, the options included and the size and number of ground return wires used.

The following illustration and associated formulae will permit correct installation of the instrument.



6 DIGIT UNIT (Basic Unit)

$$.04 \left[\frac{L_1R}{G} + \frac{2L_2R}{G} + \frac{3L_3R}{G} + \frac{4L_4R}{G}\right] \leq 0.4$$

9 DIGIT UNIT (Includes Days Option)

$$.06 \left[\frac{L_1R}{G} + \frac{2L_2R}{G} + \frac{3L_3R}{G} + \frac{4L_4R}{G}\right] \leq 0.4$$

G Number of ground return wires used.

R Resistance per foot of ground return wire.

#24 Wire R = .025
#22 Wire R = .016
#20 Wire R = .010

L4 Cable length (in feet) from digital source to first remote display unit.

L3 Cable length (in feet) from first to second remote display unit.

L2 Cable length (in feet) from second to third remote display unit.

L1 Cable length (in feet) from third to final remote display unit.

EXAMPLE #1

6 DIGIT UNIT (Basic Unit)

L4 = 10 feet
L3 = 10 feet
L2 = 15 feet
L1 = 100 feet
G = 3 (ground return wires)
R = .016 (#22 wire)

$$.04 \left[\frac{L_1 R}{G} \quad \frac{2L_2 R}{G} \quad \frac{3L_3 R}{G} \quad \frac{4L_4 R}{G} \right] \leq 0.4$$

$$.04 \left[\frac{100 \times .016}{3} + \frac{2 \times 15 \times .016}{3} + \frac{3 \times 10 \times .016}{3} + \frac{4 \times 10 \times .016}{3} \right] \leq 0.4$$

$$.04 [0.53 + 0.16 + 0.16 + 0.213] \leq 0.4$$

$$.04 [1.063] \leq 0.4$$

$$.04252 \leq 0.4$$

Since 0.04252 is less than 0.4, this configuration is possible.

EXAMPLE #2

9 DIGIT UNIT (Includes Days Option)

L4 = 20 feet
L3 = 10 feet
L2 = 70 feet
L1 = 10 feet
G = 1 (1 ground return wire)
R = .01 (#20 wire)

$$.06 \left[\frac{L_1 R}{G} + \frac{2L_2 R}{G} + \frac{3L_3 R}{G} + \frac{4L_4 R}{G} \right] \leq 0.4$$

$$.06 \left[\frac{10 \times .01}{1} + \frac{2 \times 70 \times .01}{1} + \frac{3 \times 10 \times .01}{1} + \frac{4 \times 20 \times .01}{1} \right] \leq 0.4$$

$$.06 [0.1 + 1.4 + .3 + .8] \leq 0.4$$

$$.06 [2.6] \leq 0.4$$

$$0.156 \leq 0.4$$

Since 0.156 is less than 0.4, this configuration is possible.

EXAMPLE #3

6 DIGIT UNIT (Two Remote Displays)

L2 = 120 feet
L1 = 350 feet
G = 3 (3 ground return wires)
R = .025 (#24 wire)

$$.04 \left[\frac{L_1 \times R}{G} + \frac{2L_2 \times R}{G}\right] \leq 0.4$$

$$.04 \left[\frac{350 \times .025}{3} + \frac{2 \times 120 \times .025}{3}\right] \leq 0.4$$

$$.04 [2.917 + 2.0] \leq 0.4$$

$$0.1967 \leq 0.4$$

Since 0.1967 is less than 0.4, this configuration is possible.

EXAMPLE #4

9 DIGIT UNIT (Only One Remote Display)

L1 = 2400 feet
G = 2 (2 ground return wire)
R = .016 (#22 wire)

$$.06 \quad \frac{L_1 R}{G} \leq 0.4$$

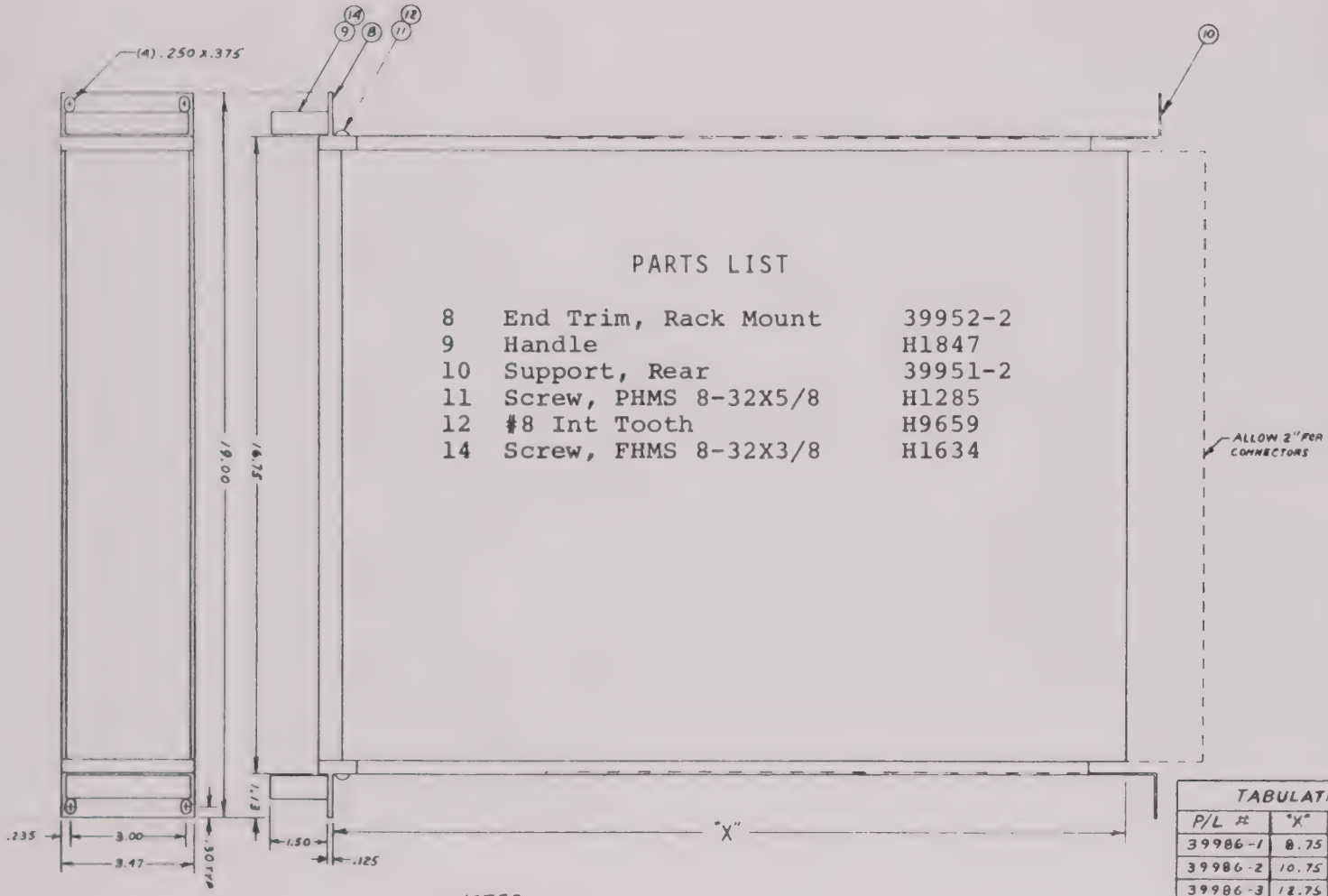
$$.06 \quad \frac{2400 \times .016}{2} \leq 0.4$$

$$.06 [19.2] \leq 0.4$$

$$1.15 \not\leq 0.$$

Since 1.15 is *not* less than 0.4, this configuration is *not* possible.

When four or more remote display units are used, the fourth unit must contain the buffer option. In calculating installation distances for more than four units, the buffered stage will replace the digital source, as the basis of calculation, for units numbered five and above.



PARTS LIST

8	End Trim, Rack Mount	39952-2
9	Handle	H1847
10	Support, Rear	39951-2
11	Screw, PHMS 8-32X5/8	H1285
12	#8 Int Tooth	H9659
14	Screw, FHMS 8-32X3/8	H1634

NOTES:

1. INSTR. ARE DRILLED TO ACCEPT 20" JONATHAN 120 QD SERIES SLIDES
2. ITEM 10 DELETED WHEN SHIPPED W/SLIDES

TABULATION

P/L #	"X"	INSTR. DEPTH
39986-1	8.75	9.12
39986-2	10.75	11.12
39986-3	12.75	13.12
39986-4	14.75	15.12
39986-5	16.75	17.12
39986-6	18.75	19.12
39986-7	20.75	21.12

FIGURE 2.1 3½" FULL RACK ASSEMBLY #039986-5 REV A

CHAPTER 3
OPERATION

3.1 GENERAL

Since the Model 8180 is a fully automatic instrument, no preliminary adjustments are required and no operator controls are provided.

The only steps necessary to bring the unit to a fully operational condition are to install the signal cable and connect the power cord.

3.2 OPERATING CONDITIONS

Operating temperatures should be limited as follows:

Maximum Temperature: 150°F (65°C)

Minimum Temperature: 32°F (0°C)

CHAPTER 4
MAINTENANCE

4.1 FACTORY SERVICE

When the instrument requires service, the nearest Systron-Donner representative should be contacted. He can provide field service or arrange for factory returns, when necessary. Address all inquiries on operation or applications to your nearest sales representative; or Sales Manager:

SYSTRON-DONNER CORPORATION
DATA PRODUCTS DIVISION
935 Detroit Avenue
Concord, California 94518
Phone: (415) 798-9900
TWX: 910-481-9479
Cable: SYSTRONDONNER

Specify both model and complete serial number in all correspondence.

4.2 ROUTINE MAINTENANCE

A regular program for maintenance and inspection every five to six months is recommended for this unit. As part of these regular procedures, the instrument should be checked in the following manner:

1) Disconnect ac power and remove the top and bottom covers.

2) Make a thorough visual inspection of all wiring and cables. Check for frayed, loose or burned wires.

3) Check the physical integrity of all components. Look for burned or cracked components, loose solder connections, leakage of insulation compounds and general physical damage. When a printed-circuit board contains integrated-circuit packages, ensure that all packages are firmly mounted. Never unnecessarily remove and replace a package.

4) Check all front panel switches and controls for loose or broken terminals, loose or sticking shafts, etc.

5) If the internal panel surfaces and components have an excessive amount of dust deposited on them, use a soft brush and low-pressure stream of air to remove the foreign material.

CAUTION

Do not clean P.C. boards or small internal components with a stiff brush or solvents, since damage to the circuits may result. A high-powered vacuum cleaner device should not be used on small internal components.

6) Wipe the external surfaces of the instrument with a soft damp cloth to remove dirt, fingerprints and other foreign materials.

7) Replace the top and bottom covers and reconnect ac power. If performance does not match or exceed the specifications listed in Chapter 1 of this manual, corrective maintenance is in order.

4.3 PRINTED-CIRCUIT BOARD REPAIR

When replacing integrated circuits or other electronic components soldered to printed-circuit boards, the procedures indicated below must be followed or damage to the board may result:

1) Determine by troubleshooting techniques, which integrated circuit or discrete component(s) has failed.

2) Remove the defective component(s) from the board by cutting the pins or leads with a small diagonal clipping tool. (Always remove and replace the entire component.)

3) Apply heat (40-50 W soldering iron) sparingly to each of the cut pins or leads and remove from the board: clean the hole(s) with a toothpick or solder suction tool.

4) Form the tinned leads of the replacement part and insert in the printed circuit holes: solder, then trim leads to extend 1/16-inch beyond the back surface of the board. (Use only 63-37 solder with maximum 1/16-inch diameter.)

CAUTION

Always trim semiconductor leads only after soldered installation is complete. This procedure greatly lessens the possibility of component failure due to shock-wave damage caused by the trimming tool.

5) When soldering semiconductor devices and all small components, be sure to use a heat sink tool or long-nosed plier connected to the component lead(s) while each is being soldered. Allow the soldered connection to cool before removing the heat sink.

6) Clean all dirt and solder-flux from the printed circuit traces by liberal application of isopropyl alcohol or freon-type solvents.

CHAPTER 5
FUNCTIONAL DESCRIPTION

5.1 GENERAL

The Model 8180 Remote Display is shown on Schematic #7-07136201. The power supply and the T.O.D. section which form the basic unit are shown at the left. The optional days addition is shown on the right. Optional output buffers are shown along the bottom of the schematic. All the circuitry is contained on a single P.C. Board with the exception of the power supply components shown on Schematic #7-071453 and the display tubes shown in dotted outline at the top of Schematic #7-07136201. The display tubes are mounted in sockets on a separate P.C. Board which is connected to the main board through right angle pin assemblies.

5.2 POWER SUPPLY

The power supply consists of the ac input connector, line filter, fuse and transformer shown on Schematic #7-071453 plus the circuitry shown at the upper left on Schematic #7-07136201. Diodes CR2 and CR3 supply unregulated +10 volts to voltage regulator Q2 which, in turn, supplies regulated +5 volts through filter C2, L1, C4 as the Vcc supply to all IC's. Bridge CR4-CR7 provides unregulated +210 volts through fuse F2 (located on PC Board) to series pass transistor Q1. The regulated +180 volt output from A1 is fed to the display tubes.

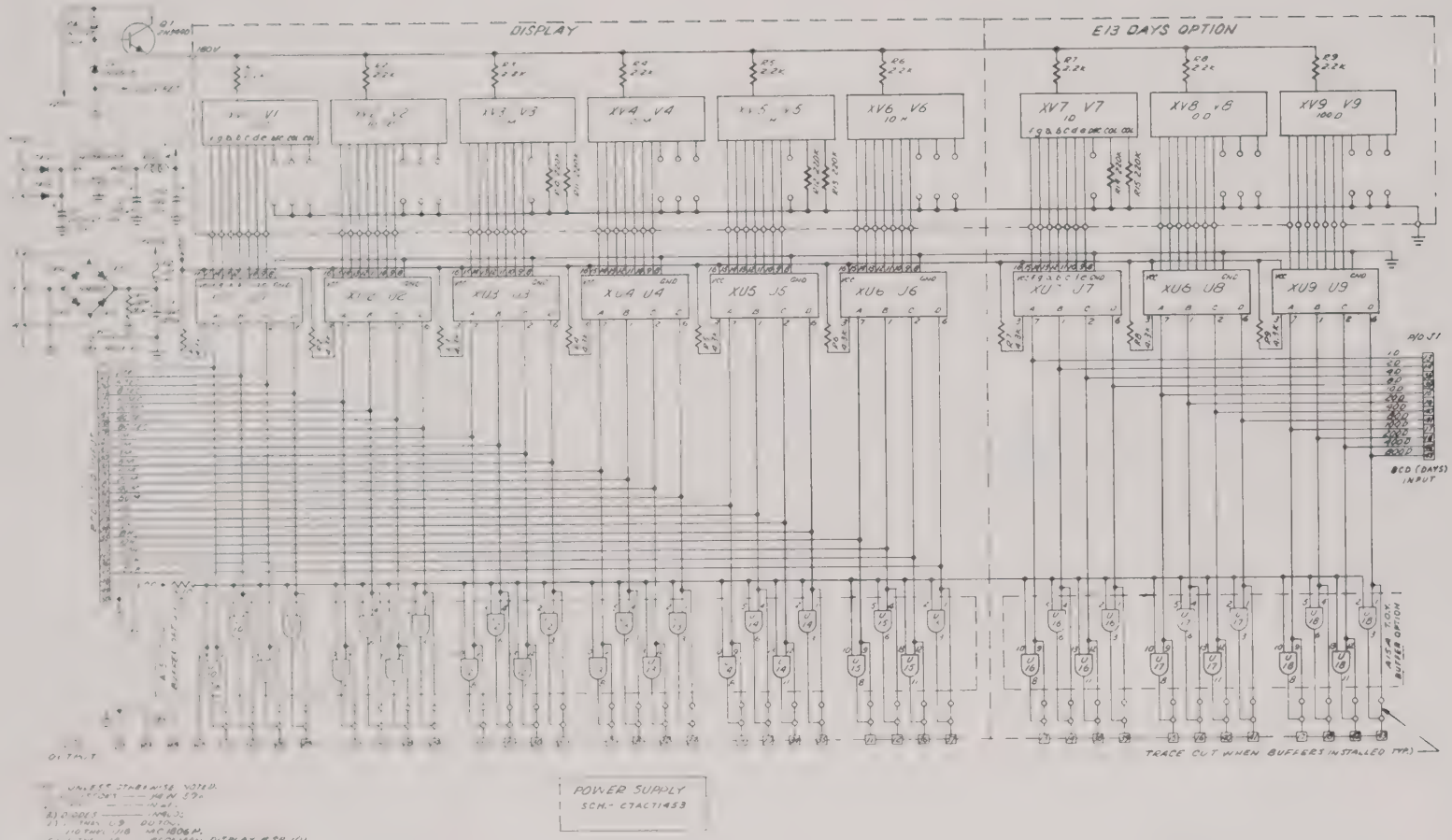
5.3 DISPLAY CIRCUITRY

In the basic unit, parallel BCD time-of-day (T.O.D.) inputs are fed through BCD INPUT connector J1 to display drivers U1-U6 and BCD OUTPUT connector J2. The display drivers decode the 8-4-2-1 BCD inputs and drive seven-segment display tubes V1-V6. Since T.O.D. in hours, minutes and seconds is displayed, colons within V3 and V5, are lit by grounding the COL inputs to these tubes through R10-R13. (The 40S, 40M, 40H and 80H inputs to J1 are grounded at the source.)

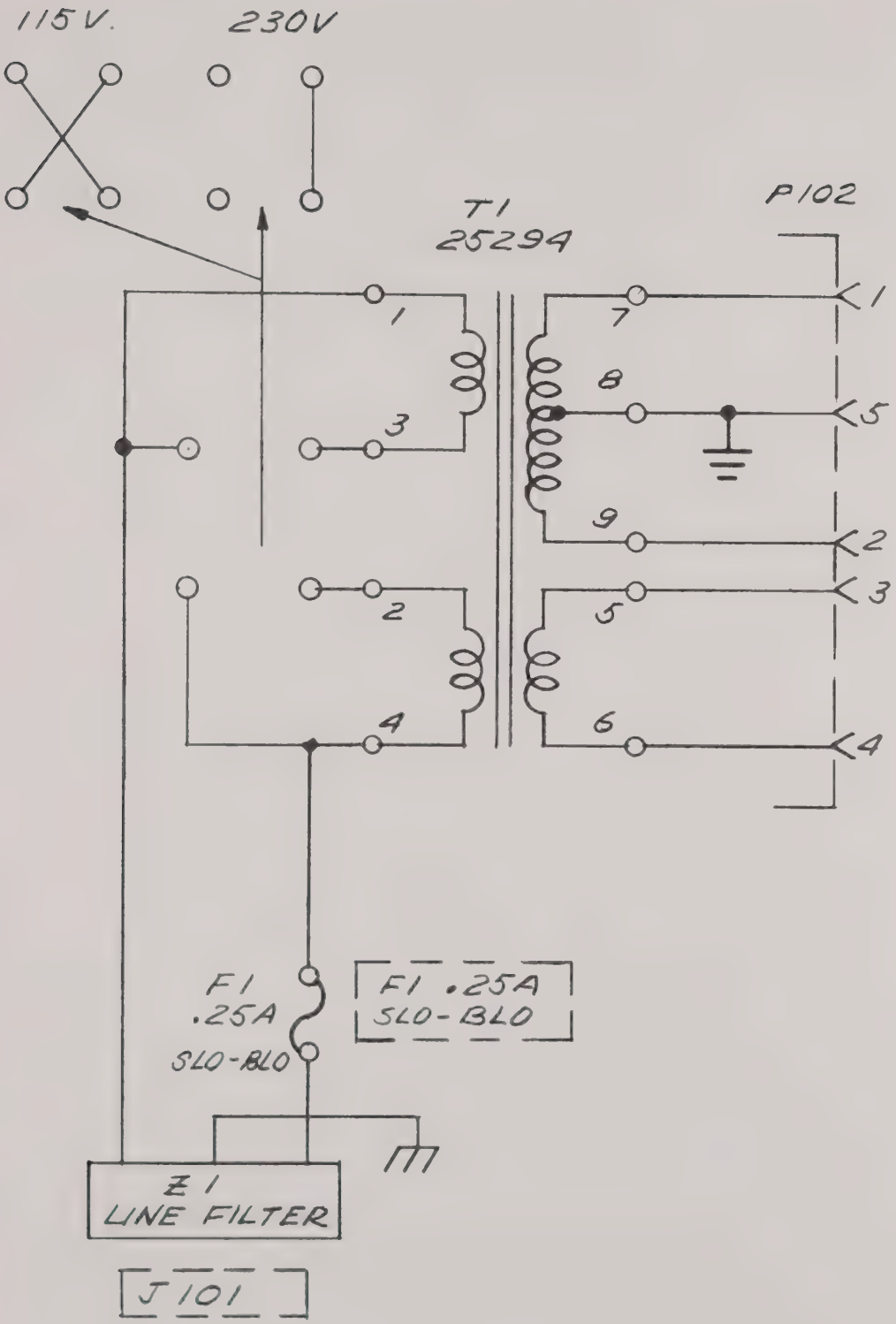
The Days Option (E13) adds display drivers U7-U9, display tubes V7-V9 and related components. The colon in V7 is lit via R14 and R15.

5.4 BUFFERS

The optional buffers are shown at the bottom of the schematic. Option A15 adds U10-U15. Option A15A adds U10-U18 which includes days. When buffers are added the PC traces indicated on the schematic are cut.



SCHEMATIC REMOTE DISPLAY MODEL 8180 #7-07136201 REV B

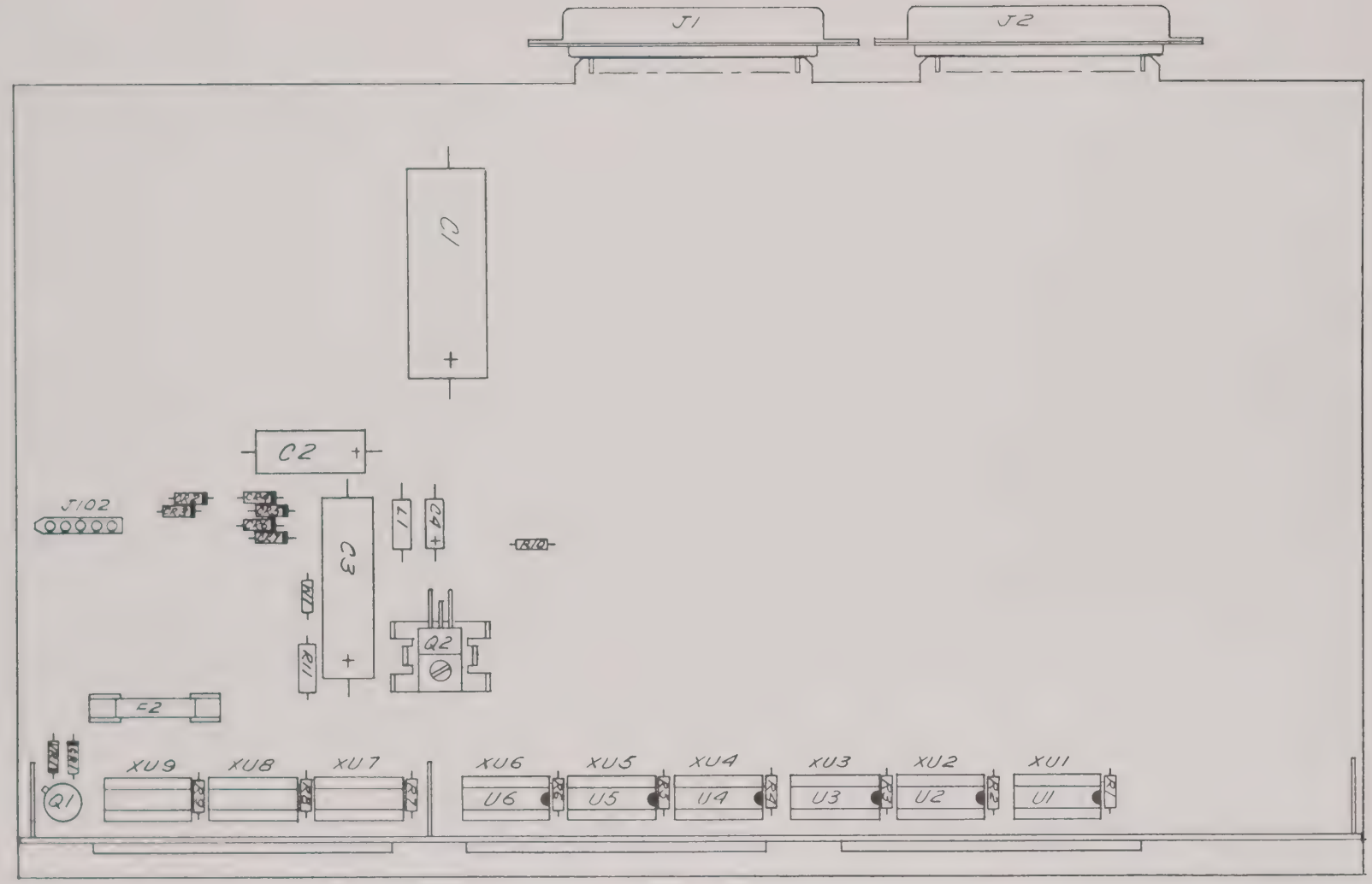


SCHEMATIC POWER SUPPLY #7-071453 REV B

PARTS LIST

FINAL ASSEMBLY #071427

REF.	DESCRIPTION	SD PART NO.
	Shipping Assembly	071427
	Assembly, Test	071426
	Side Trim	03986901
	End Trim Rack Mount	03995202
	Trim Strip	071464
	Trim Strip Insert	071428
	Front Trim	033762
	Top Cover	03376001
	Window	071350
	Handle	100927
	Nomen Panel	071467
P1,2	Connector, 50 pin	101157
	Bracket	039857
	Nut, Tinnerman	100959
	Cord, Vinyl	100955
	Line Cord	102407
	Test Assembly	071426
	Assembly, Interconnect	07136201
	Assembly, Rear Panel	071372
	Schematic	7-07136201
	Assembly, Front Panel	071348
	Gusset	071357
	Bracket, P.C. Board, Left	07135202
	Bracket, P.C. Board, Right	07135201
V1-6	Beckman Display, SP-101	116082
	Rear Panel Assembly	071372
	Schematic, Power Supply	7-071453
F1	Fuse, ½ A, Slo-Blo	100600
XF1	Fuse Holder	102409
J1	Transformer	025294
J101	Receptacle w/filter	102461
P102	Plug Shell, Molex 03-06-2055	101263
	Contact Female, Molex 02-06-1132	10282201
	Connector Mounting Plate	071369
	Transformer Mounting Bracket	116085

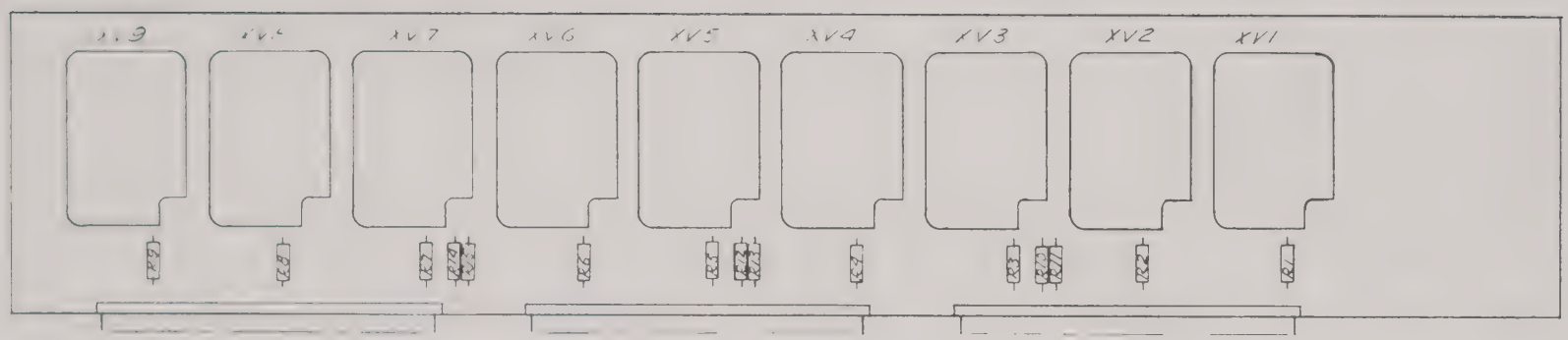


ASSEMBLY INTERCONNECT P.C. BOARD #07136201 REV D

PARTS LIST

INTERCONNECT BOARD #07136201 REV D

REF.	DESCRIPTION	SD PART NO.
	Assembly, Interconnect Board	07136201
	Schematic	7-07136201
	Assembly, Readout	07136001
C1	Capacitor, 2500 µF, 15 V, Tant	100247
C2	Capacitor, 125 µF, 10 V, Tant	100246
C3	Capacitor, 10 µF, 450 V, Tant	100062
C4	Capacitor, 39 µF, 20 V, Tant	102561
CR1	Diode, 1N5297	100457
CR2-7	Diode, 1N4005	100413
F2	Fuse, .125A	100592
J1,2	Connector, 50 pin, 57-40500	101156
L1	Inductor, R45-4	101313
Q1	Transistor, 2N3440	101420
Q2	Transistor, MC7805CP	045256
R1-9	Resistor, 4.3 k 5%, ¼ W, CC	101546
R10	Resistor, 1 k 5%, ¼ W, CC	101569
R11	Resistor, 220 k 5%, ¼ W, CC	101458
U1-6	Integrated Circuit, DO700	045203
W1	Jumper	102879
XF2	Fuse Clip	102745
XJ101	Recept. Shell, Molex 03-06-1055	101264
XU1-9	Socket, 16 pin	103350
VR1	Diode, 1N991B	100461
	Bracket, Display Board	051450
	Contact Male, Molex 02-06-8103	10282203



ASSEMBLY READOUT P.C. BOARD #07136001 REV B_1

PARTS LIST

READOUT BOARD #07136001 REV B_1

REF.	DESCRIPTION	SD PART NO.
	Assembly	07136001
R1-9	Resistor, 2.2 k 5%, ¼ W, CC	101562
R10-15	Resistor, 220 k 5%, ¼ W, CC	101610
	Connector, 30 pin	101277
XV1-XV9	Socket,Beckman C5-101	116083

CHAPTER 6
SPECIAL MODIFICATIONS

7.1 GENERAL

Modifications to the Model 8180, requested by the customer, are documented in this chapter. These are usually extra-cost items to tailor the unit for a specific application.

PARTS LIST
BUFFER OPTION (A15) #071477 REV A

REF.	DESCRIPTION	SD PART NO.
	Schematic	7-07136201
U10-15	Integrated Circuit, MC1806P	025733

* * * * * * * * * * *

PARTS LIST
DAYS OPTION (E13) #071476 REV A

REF.	DESCRIPTION	SD PART NO.
	ADD	
	Schematic	7-07136201
U7-9	Integrated Circuit, DD700	045203
V7-9	Display, Beckman, SP-101	116082
	Trim Strip Insert (9)	071429
	DELETE	
	Trim Strip Insert (6)	071428

* * * * * * * * * * *

PARTS LIST
BUFFER OPTION (S15A) #071478 REV A

REF.	DESCRIPTION	SD PART NO.
U16-18	Integrated Circuit, MC1806P	025733

PARTS LIST

MOUNTING YOKE OPTION (M16) #071469 REV A

REF.	DESCRIPTION	SD PART NO.
	ADD	
	Yoke	02174811
	Spacer, Atlantic India Rubber	100950
	Work Positioner/Base	100951
	Thumb Screw	100949
	Side Cover	071371
	End Trim	033693
	DELETE	
	End Trim, Rack Mount	03995202
	Handle	100927

MP MASTER
MA34111